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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/747,304

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EXAMINER

DAVIS, OCTAVIA L

ART UNIT

PAPER NUMBER

2855

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/747,304

Applicant(s)
Prakash et al

Examiner
Octavia Davis

Art Unit
2855

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-100 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-100 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 20) ☐ Other:

Serial Number: 09/747, 304

Art Unit: 2855

3/18/03

DETAILED ACTION

Double Patenting

1. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 1 - 100 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 113 of copending Application No. 09/502, 406. Although the conflicting claims are not identical, they are not patentably distinct from each other because the difference

between claims 1 - 113 of Application No. 09/502, 406 and claims 1 - 100 is biasing the ferromagnetic layers with an externally applied current, as noted in claims 1 - 113, as opposed to the general inclusion of ferromagnetic layers, as noted in claims 1 - 100. However, such a difference would be considered clearly obvious to one having ordinary skill in the art to provide in claims 1 - 109 of the application, as noted by claims 1 - 100, the desire to be more specific about the ferromagnetic layers.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Applicant is advised that should claims 1 - 100 be found allowable, claims 1 - 113 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in

the United States.

3. Claims 1, 7, 9 - 15, 17 - 19, 22 - 26, 31, 33, 34, 37 - 41, 42 - 53, 59, 62 - 65, 68, 71 - 73 and 78 - 89 are rejected under 35 U.S.C. 102(b) as being anticipated by Gurney et al (5, 408, 377).

Regarding claims 1, 18, 53, 62, 63, 65, 86, 87 and 89, Gurney et al (8377) disclose an apparatus capable of sensing pressure comprising a sensing device including a sensor 60 having a substrate 61 composed of a nonmagnetic material such as glass, Sic or the like, the sensor including a plurality of layers, the layers comprising a current biased magnetostrictive sensor including a non-magnetic conducting layer 62 disposed between two free ferromagnetic layers 71, 73, means 94 for sensing a resistance in the layers upon application of pressure while an externally supplied current is being applied, the applied pressure causing the magnetization vectors to change from the biased state through the property of a non-zero magnetostriction and thereby result in a change in resistance to a tunneling current produced by the applied voltage that flows in a direction orthogonal to a plane of the layers (See Cols. 5 and 6, lines 40 - 65 and 29 - 57).

Regarding claims 9, 10 - 15, 17, 31, 37, 42, 44 - 52, 64, 78 - 81 and 88, layers 70 and 71 are free ferromagnetic layers and layer 77 is the pinned ferromagnetic layer, the sign of the magnetostriction in the free layer 70, 71 being such that only

compressive forces are sensed (See Cols. 5 and 6, lines 45 - 54 and 43 - 53).

Regarding claims 19 and 68, the ferromagnetic layers 77 are composed of NiFe or CoFe alone or in combination.

Regarding claims 22, 23 - 26, 33, 34 and 71 - 73, the sensor includes a buffer or capping layer 62, Ta, disposed between layers 61 and 71 (See Col. 5, lines 44 - 47).

Regarding claims 38 - 41, 43 and 82 - 85, a protective coating layer 81 is disposed above the upper ferromagnetic layer 70 and a conductive layer 82 is disposed over the insulating layer.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2 - 8, 16, 32, 55 - 61, 66, 67 and 90 - 100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gurney et al (5, 408, 377) in view of Gurney et al (5, 856, 617) and Hasegawa et al.

Regarding claims 2, 3, 16 and 66, Gurney et al (8377) lack a teaching of wherein in an initial state the magnetization vectors are parallel. However, Hasegawa

et al disclose a multilayer thin film structure for magnetoresistive devices comprising a non-magnetic conducting layer 31 providing ferromagnetic coupling of two free ferromagnetic layers 32, 34 in an initial state such that the magnetization vectors of each free layer are parallel to each other (See Col. 8, lines 10 - 31). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify Gurney et al (8377) according to the teachings of Hasegawa for the purpose of, inducing a uniaxial stress in the multi-layer thin film structure.

Regarding claims 4, 8, 32, 55, 60, 61, 67 and 100, Gurney et al (8377) lack the sensing device including a plurality of sensors that are formed in a two dimensional array and operate as the one sensor so that each sensor detects the pressure of an area associated with that sensor. However, in Gurney et al (8377) it was commonly known to those of ordinary skill in the art that additional sensor elements could be employed (See Col. 6, lines 30 - 37). . Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize additional sensor elements to provide an optimal sensor response circuit, recognized in Gurney et al, as discussed above.

Regarding claims 5, 6 and 56 - 58, Gurney et al (8377) lack sensing a reference resistance of the device when the ferromagnetic layers are in the biased state without the application of pressure. However, Gurney et al (6617) disclose sensing an initial resistance, utilizing means 25 (See Fig. 5), of the device when magnetizations of

ferromagnetic layers 112 - 114, 116 are in a biased state without the application of pressure (See Fig. 2C) (See Cols. 5 and 6, lines 36 - 64 and 11 - 24). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify Gurney et al (8377) according to the teachings of Gurney et al (6617) for the purpose of, sensing a resistance change to determine cantilever deflection.

Regarding claims 90 - 99, Gurney et al (8377) lack the support structure being a deformable beam formed of semiconductor layers, the beam having a length between 2 microns and several hundred microns, a thickness ranging from 0.1 microns to 20 microns and a width ranging from 1 micron to several microns. However, Gurney et al (6617) disclose means for deforming and patterning a support structure 23 of which constitutes a membrane and /or a microfabrication deformable beam (See Col. 7, lines 27 - 36). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify Gurney et al (8377) according to the teachings of Gurney et al (6617) for the purpose of, providing a cantilever to scan the surface of a sample and increasing the sensitivity of a cantilever detection technique in AFM systems so that smaller amounts of cantilever movement can be readily detected.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 20, 21, 69 and 70, are rejected under 35 U.S.C. 103(a) as being unpatentable over Gurney et al (8377) in view of Gurney et al (6617) and Hasegawa et al, as applied to claims 1 - 19, 22 - 60, 62 - 68 and 71 - 100 above, and further in view of Smith.

Regarding claims 20, 21, 69 and 70, the combination of Gurney et al (8377), Gurney et al (6617) and Hasegawa et al disclose all the limitations of these claims except the thickness of a non-magnetic insulating layer being within the range of 0.1 to 10nm. However, Smith discloses a GMR-DMR sensor structure comprising ferromagnetic layers 16, 18 and a layer 22 being within a specific range (See Col. 6, lines 46 - 62) and the sensor having a length of 1 to several hundred microns (See Col. 6, lines 46 - 62). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify the combination of Gurney et al (8377), Gurney et al (6617) and Hasegawa et al according to the teachings of Smith for the purpose of, the improving bias uniformity and choosing the thickness of the

layers to optimize the properties of the sensor.

Regarding claims 27 - 30, 35, 36 and 74 - 77, the combination of Gurney et al (8377), Gurney et al (6617) and Hasegawa et al disclose all the limitations of these claims except an interlayer disposed between at least one of the ferromagnetic layers and the nonconducting spacer for increasing GMR response and reduce interdiffusion, the interlayer being comprised of Co and CoFe. However, Smith discloses a GMR-DMR sensor structure 10 comprising a substrate 12, a plurality of ferromagnetic layers 16, 18 ferromagnetically coupled (cl 48), an interlayer 20 disposed between at least one of the ferromagnetic layers and a nonconducting spacer layer 22 for increasing GMR response and reducing interdiffusion (See Col. 6, lines 15 - 29) (See Col. 7, lines 1 - 5). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify the combination of Gurney et al (8377), Gurney et al (6617) and Hasegawa et al according to the teachings of Smith for the purpose of, choosing the composition of the layers to optimize the properties of the sensor.

Relevant Art


8. The prior art made of record but not relied upon includes Chen et al (5, 491, 600).

9. Any inquiry concerning this communication should be directed to Examiner Octavia Davis at telephone number (703) 306 - 5896. The examiner can normally be reached on Monday - Thursday (9:00 - 5:00), alternate Fridays off.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 - 0956.

JD

OD/2855


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